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## CERTIFICATE

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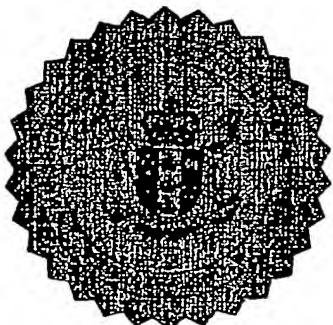
I hereby certify that annexed is a true copy of the Provisional Specification as filed on 15 June 2001 with an application for Letters Patent number 512423 made by CO2 PAC LIMITED.

Dated 3 September 2001.

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Neville Harris  
Commissioner of Patents



512423

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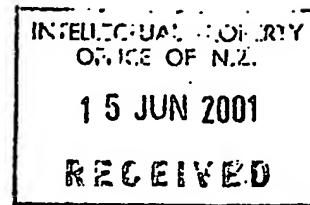
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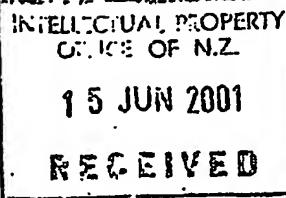
PROVISIONAL SPECIFICATION

HOT FILL COLLAPSIBLE CONTAINER

We, CO2 Pac Limited, a New Zealand company, of 88-90 Balmoral Road,  
Mt Eden, Auckland New Zealand do hereby declare this invention to be  
described in the following statement:

PT0442113





## HOT FILL COLLAPSIBLE CONTAINER

### Background to Invention

5 This invention relates to containers, particularly semi-rigid polyester collapsible containers capable of being filled with hot liquid, and more particularly to an improved construction for initiating collapse in such containers.

10 'Hot-Fill' applications impose significant mechanical stress on a container structure. The thin sidewall construction of a conventional container deforms or collapses as the internal container pressure falls following capping because of the subsequent cooling of the liquid contents. Various methods have been devised to sustain such internal pressure change while maintaining a controlled configuration.

15 Generally, the polyester must be heat-treated to induce molecular changes resulting in a container that exhibits thermal stability. In addition, the structure of the container must be designed to allow sections, or panels, to 'flex' inwardly to vent the internal vacuum and so prevent excess force being applied to the container structure. The amount of 'flex' available in each panel is limited, however, and as the limit is reached the force is transferred to the sidewall, and in particular the areas between the panels, of the container causing them to fail under any increased load.

20 Additionally, vacuum force is required in order to flex the panels inwardly to accomplish pressure stabilisation. Therefore, even if the panels are designed to be extremely flexible and efficient, force will still be exerted on the container structure to some degree.

25 The principal mode of failure in all prior art known to the applicant is non-recoverable buckling, due to weakness in the structural geometry

of the container, when the weight of the container is lowered for commercial advantage. Many attempts to solve this problem have been directed to adding reinforcements to the container sidewall or to the panels themselves.

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### Objects of the Invention

10 It is thus an object of the invention to provide a semi-rigid container which is able to compensate for vacuum pressure in the container and/or to overcome the problems with prior art proposals and identified above or at least to provide the public with a useful choice.

### Summary of the Invention

15 According to one aspect of this invention there is provided a semi-rigid container, a side- wall of which has at least one substantially vertically folding vacuum panel section to compensate for vacuum pressure within the container.

20 Preferably the telescopic vacuum panel is capable of flexing inwardly under low vacuum force, and enables expansion from the collapsed state when the container is uncapped and vacuum released.

25 Further aspects of the invention which should be considered in all its novel aspects will become apparent from the following description.

### Brief Description of Drawings

30 Figure 1: shows a container according to one possible embodiment of the invention:

Figure 2: shows the container of Figure 2 after collapse;

Figure 3: shows a cross-sectional view of the container of Figure 2;

5 Figure 4: shows a cross-sectional view of the container of Figure 1.

#### DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

10 The present invention relates to collapsible semi rigid containers having a side wall with at least one substantially vertically folding vacuum panel section which compensates for vacuum pressure within the container.

15 Preferably in a one embodiment the flexing may be inwardly under low vacuum force. This will enable expansion from the collapsed state when the container is uncapped and vacuum released.

20 This causes ready evacuation of volume without increased internal vacuum force as in from prior art vacuum panels. Vacuum pressure is subsequently reduced to a greater degree than prior art causing less stress to be applied to the container sidewalls.

25 Referring now to the drawings, when the vacuum pressure is adjusted following application of a cap (not shown) to the container 100, and subsequent cooling of the contents, top load capacity for the container 100 is maintained through upper sidewall 2 and lower sidewall 3 contact occurring through complete or substantially complete vertical collapse of the vacuum panel section 1, see Figures 2 and 3.

30 This increased venting of vacuum pressure provides advantageously for less force to be transmitted to the sidewalls 2 and 3 of the container 100. This allows for less material to be necessarily utilised in the container construction, making production cheaper.

This also allows for less failure under load of the container 100 and there is no longer any requirement for panel area to be necessarily deployed in the design of hot-fill containers. Consequently, this allows for the provision of other more aesthetically pleasing designs to be employed in container design for hot-fill applications. Further, this allows for a label to be fully supported by total contact with a sidewall which allows for more rapid and accurate label applications.

10 Additionally, when the cap is released from a vacuum filled container, one embodiment of the invention may allow for the vacuum collapse panel to immediately telescope back to its original position. This provides for increased tamper-evidence for the consumer, and also forces an immediately larger headspace in the container which not only aids in pouring of the contents, but prevents 'blow-back' of the contents, or spillage upon first opening.

20 Further embodiments of the present invention may allow for a telescopic vacuum panel to be depressed prior to, or during, the filling process for certain contents that will subsequently develop internal pressure before cooling and requiring vacuum compensation. In this embodiment the panel is compressed vertically, thereby providing for vertical telescopic enlargement during the internal pressure phase to prevent forces being transferred to the sidewalls, and then the panel is 25 able to collapse again telescopically to allow for subsequent vacuum compensation.

30 Still, further, the telescopic panel provides good annular strengthening to the package when opened.

Although a single panel portion 1 is shown in the drawings it is envisaged that more than one may be utilised.

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